REMARKS

This communication responds to the Office Action of April 8, 2005. This response is timely by virtue of the concurrently filed Petition for Extension of Time and the requisite fees.

Applicants have amended the claims to correct minor typographical errors in Claims 40 and 80. Entry of the claim amendments and favorable reconsideration of the claims are respectfully requested.

Claim Rejections Under 35 U.S.C. § 112, ¶ 1

The Office Action asserted that Claims 40-51 and 79-86 lacked written description under 35 U.S.C. § 112, 1, allegedly because there was not sufficient support for the recitation of a decomposition rate of 80% to 100% (Claims 40, 48, 80, and 81), or "95% to 100%" (Claim 83). Applicants respectfully disagree.

The Office Action stated that the support for 100% was shown for the decomposition of C_3F_8, but not for other species under examination. However, Figure 9 and page 39, lines 15-19 shows that for CF_4, the decomposition rate reached 100%. Furthermore, Example 11 and page 40, lines 25-26 in Example 10, as well as Example 11 and page 41, lines 12-13 showed decomposition rates of "99% or more" Because it is well-established law that adequate written description does not require that each and every species of a claimed genus be specifically, applicants respectfully submit that the specification sufficiently provides support for the claim recitation of 100% decomposition rate.

The Office Action further questions the adequacy of support for the recitation of "2 to 10% by volume" and "0.5 to 10% by volume. It is respectfully pointed out that the lower limit of 2% by volume of the concentration of fluoride compound is supported by the specification at page 35, lines 5-6, and that of 0.5% by volume can be found at page 29, lines 15-16.

Accordingly, it is respectfully submitted that the specification as originally filed provides adequate written description for the claim language, and the claim rejections under 35 U.S.C. § 112 are improper and should be withdrawn.

Claim Rejection under 35 U.S.C. § 103

The Office Action maintained the rejections of the claims for alleged obviousness over Rossin *et al.* (U.S. Pat. No. 6,069,291), optionally in view of Okazake *et al.* (U.S. Pat. No. 5,151,263) and Imaura (U.S. Pat. No. 5,649,985). Applicants respectfully submit that this rejection is improper and should be withdrawn.

The Office Action maintained that because Rossin disclosed adding Ni to an aluminum oxide catalyst, it would have been obvious to select one of many specifically disclosed compounds, in the absence of unexpected results. The Office Action stated that Rossin *et al.* disclosed that perfluoroalkanes at a concentration of 5,000 ppm can be treated, in the presence of oxygen and water, with an aluminum oxide catalyst, which can be stabilized with any of numerous metal and non-metal elements, including Ni. The Office Action apparently believed that the catalyst disclosed in Rossin was just as effective in every aspect as the claimed catalyst. This is, however, clearly incorrect. The reasoning upon which the obviousness rejections are maintained is flawed for two reasons. **First**, the Office Action failed to place any credence on the claim language that the high decomposition rate is "maintained." One of ordinary skills in the relevant will understand that, although the claims of the instant application do not recite specific length of time in which the process/catalyst of the instant invention achieves the recited efficacy, the claimed process and products must *maintain* the recited efficacy. Any process that fails to maintain the efficacy is outside the scope of the claimed invention. This is materially different from a process that achieves the high efficacy only occasionally or fleetingly.

Secondly, the reasoning of the Office Action is flawed because it took a mechanical view of the gas conversion process. The claimed process and products are clearly suitable for use with a gas source containing a high fluorine compound concentration. One of ordinary skilled in the art will immediately recognize that this process is materially different than the process of Rossin, despite the fact that the recited concentration range may overlap at the extreme lower end with the extreme higher end of Rossin (i.e. at 0.5%).

As discussed previously in applicants' response to the previous Office Action, the Office Action's reliance on *Merck & Co. v. Biocraft Labs, Inc.,* 874 F.2d 804, 10 USPQ2d 1843, 1846 (Fed. Cir.) *cert. denied,* 493 U.S. 975 (1989), is misplaced. *Merck v. Biocraft* does not establish a rule that a disclosed broad genus *per se* renders obvious a species encompassed thereby. To the contrary, it is well established that "[t]he fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious." *In re Baird*, 16 F.3d 380, 382, 29 USPQ2d 1550, 1552 (Fed. Cir. 1994). See also *In re Jones*, 958 F.2d 347, 350, 21 USPQ2d 1941, 1943 (Fed. Cir. 1992) (Federal Circuit has "decline[d] to extract from *Merck* [*v. Biocraft*] the rule that... regardless of how broad, a disclosure of a chemical genus renders obvious any species that happens to fall within it.").

Again, as previously pointed out, the claims under rejection in the instant case are ***method*** claims, not the chemical composition claims discussed in *Merck v. Biocraft*. Furthermore, the instantly claimed methods achieve superior results not expectable from the prior art. Rossin *et al.*, which discloses aluminum catalysts that can be stabilized with numerous other elements, does not render obvious a method that specifically uses an aluminum-***nickel*** oxide catalyst for treating a **gas containing 0.5% to 10% fluorine compounds** and that achieves a **conversion rate of 80-100%, for an extended period of time**. Because (1) data from comparative experiments contained in the Specification

and two declarations by one of the inventors (Mr. Kanno) convincingly show that the instantly claimed methods achieve superior and unexpected results of increased catalyst reactivity for an extended period of time at high starting fluorine compound concentrations of 5,000 ppm or higher, and (2) Rossin *et al.* merely mentions that many metal and non-metal elements could be used to *stabilize* an aluminum catalyst, but does not teach or suggest which of these elements would accomplish an increased catalyst reactivity with high starting fluorine compound concentrations for an extended period of time, the instantly claimed methods are not obvious over the cited prior art and should be allowable.

Specifically, Example 6 of the Specification compares various catalysts containing alumina and another element. The results are summarized in Figure 6. This *side-by-side* comparison of many catalysts showed that the two containing Ni were superior in achieving *high reduction rate* of CF compounds.

Furthermore, in his February 7, 2002 Declaration ("the First Kanno Declaration"), Mr. Kanno declared that "[o]ne skilled in the art would have expected a rapid deterioration of catalytic activity during treatment of a gas having a concentration of 5,000 ppm of a fluorine compound." This statement is supported by data contained in Rossin *et al.* itself as well as by Mr. Kanno's September 12, 2003 declaration ("Second Kanno Declaration").

With the exception of Examples XV and XVII, all test runs of Rossin *et al.* lasted less than 100 hours (Example I: 18.5 hours and 32.5 hrs.; Example II: 19.5 and 24.5 hrs.; Example VII: 19 hrs.; Example IX: 43 hrs.; Example XI: 17.5 hours; and Example XVIII: 78 hours.) When the catalysts were tested for an extended time period, Rossin *et al.* itself showed even at a starting concentration of 500 ppm, the conversion rate of some of its catalysts dropped rapidly. For example, in Example XV, the conversion rate dropped from 90-95% in the first 20 hours to about 90% up to the first 340 hours, and below 90% after 340 hours.

In the Second Kanno Declaration, Mr. Kanno prepared a Co/Zr/Al catalyst according to Example XVI of Rossin *et al.*, and compared its reactivity when the concentration of the fluorine compounds was 500 ppm vs. 5,000 ppm. The results showed that while this Co/Zr/Al catalyst was able to maintain a high conversion rate for over 99% for 2000 hours when the concentration of the fluorine compound was 500 ppm, the conversion rate dropped rapidly and dramatically (to about 35%) after just 170 hours when the concentration of the fluorine compound was 5,000 ppm.

The First Kanno Declaration further stated that a high fluorine compound concentration (5,000 ppm and above) "is typically encountered in commercial applications rather than a lower concentration of only 500 ppm as disclosed in Rossin." The First Kanno Declaration further presented data showing that the presently claimed method using the Al/Ni catalyst achieved a high reduction rate for a much longer period of time (2000$^+$ and 4000$^+$ hours), representing at least a 5- and 10-fold increase, compared to the longest run of 400 hours in Rossin *et al.*

Thus, the data in Figure 6 of the Specification and the two Kanno declarations, in combination, showed that Al/Ni catalysts were superior in terms of achieving a high reduction rate when *the starting CF concentration was 5,000 pm or higher*, and maintaining the high reduction rate for a longer period of time than catalysts containing other elements.

These superior results were achieved because Ni was found, surprisingly, to form a composite oxide and to *activate* the catalyst more than the other elements and maintain the high reduction rate for a longer period of time. See e.g. page 10, lines 1-9 of the Specification. Rossin *et al.* does not in any way teach or suggest that the reactivity (reduction rate) of the catalyst can be increased with the other elements. In contrast, Rossin *et al.* merely mentioned that many metal and non-metal elements could be used to *stabilize* the catalysts. See Rossin *et al.*, Col. 3, lines 1-7, and lines 33-41. This explains why Rossin *et*

al., although mentioning Ni as one possible element out of 17 metal and non-metal elements, states that its "***more preferred embodiments***" are cerium, titanium or zirconium, ***not Ni*** (see Rossin *et al.*, col. 4, lines 4-6). There is no suggestion or motivation in Rossin *et al.* to specifically select nickel, nor would there have been any reasonable expectation in Rossin *et al.* alone, or in combination with any other references, that an Al/Ni catalyst would be used, as in the claimed method, to achieve the superior and unexpected results of the presently claimed invention.

In essence, the Examiner argues that (1) Rossin suggested that all elements listed there are equivalent and equally good; and (2) the test results merely showed that Ni/Al is superior under certain specific conditions for a particular CF compound, but applicants had not shown that Ni/Al is superior under *all claimed conditions*. In other words, it appears to be the Examiner's position that from Rossin's teachings, Ni/Al ***may*** not be superior under some unspecified conditions. However, because ***all*** available data suggest that Ni/Al catalysts of the instant invention are superior, *unless the examiner is able to articulate a reasonable basis to conclude otherwise,* there is no reason to assert that the superiority of the Ni/Al catalysts is condition-specific. Moreover, the law is clear that applicants are not required to show unexpected results over the entire range of properties. See, e.g., *In re Chupp*, 816 F.2d 643, 646, 2 USPQ2d 1437, 1439 (Fed. Cir. 1987) (When considering whether proffered evidence is commensurate in scope with the claimed invention, it is not required that the applicant show unexpected results over the entire range of properties possessed by a chemical compound or composition.). Evidence that the invention possesses superior and unexpected properties in one of a spectrum of conditions is sufficient to rebut a *prima facie* case of obviousness. *Id.*

In short, there is nothing in the Rossin patent or anywhere else that would lead one of ordinary skill in the art to believe that the test results are "condition-

specific" or not universally applicable. Furthermore, even if the superior results are "condition specific," they are legally sufficient to rebut the *prima facie* case of obviousness.

In addition, also as previously argued by the applicants, **there is no need to recite in the claims the time period of high reduction rate achieved by the claimed methods.** The law requires only that the claims define the invention, not what the invention can accomplish. The claims recite the conditions under which the superior results are achieved, and under such conditions, the superior results are a *necessary result* of the claimed method. "In determining whether the invention as a whole would have been obvious under 35 U.S.C. 103, we must first delineate the invention as a whole. In delineating the invention as a whole, we look not only to the subject matter which is literally recited in the claim in question ... but also to those properties of the subject matter which are inherent in the subject matter. ... Just as we look to a chemical and its properties when we examine the obviousness of a composition of matter claim, it is this invention *as a whole*, and not some part of it, which must be obvious under 35 U.S.C. 103." *In re Antonie*, 559 F.2d 618, 620, 195 USPQ 6, 8 (CCPA 1977) (italics original, underline added) (citations omitted). In fact, not only the unexpected superior results need not be recited in the claims, they do not need even be in the specification. The PTO's reviewing courts had repeatedly held that evidence and arguments directed to advantages not disclosed in the specification cannot be disregarded. See e.g. *In re Chu*, 66 F.3d 292, 298-99, 36 USPQ2d 1089, 1094-95 (Fed. Cir. 1995) (Although the purported advantage of placement of a selective catalytic reduction catalyst in the bag retainer of an apparatus for controlling emissions was not disclosed in the specification, evidence and arguments rebutting the conclusion that such placement was a matter of "design choice" should have been considered. "We have found no cases supporting the position that a patent applicant's evidence or arguments traversing a § 103 rejection must be contained within the specification. There is

no logical support for such a proposition as well, given that obviousness is determined by the totality of the record including, in some instances most significantly, the evidence and arguments proffered during the give-and-take of *ex parte* patent prosecution." See also *In re Zenitz*, 333 F.2d 924, 928, 142 USPQ 158, 161 (CCPA 1964) (evidence that claimed compound minimized side effects of hypotensive activity must be considered because this undisclosed property would inherently flow from disclosed use as tranquilizer); *Ex parte Sasajima*, 212 USPQ 103, 104 - 05 (Bd. App. 1981) (evidence relating to initially undisclosed relative toxicity of claimed pharmaceutical compound must be considered). Furthermore, the specification need not disclose proportions or values as critical for applicants to present evidence showing the proportions or values to be critical. *In re Saunders*, 444 F.2d 599, 607, 170 USPQ 213, 220 (CCPA 1971).

Last but not least, the records have established that the claimed invention has achieved commercial success commensurate in scope with the claims and derived from the claimed invention, as demonstrated by Mr. Kanno in his declaration. This is because of the high reduction rate and the elimination of the need to replace the catalysts frequently. As a consequence of the superiority of the presently claimed invention, over one hundred gas treatment plants have been built by Hitachi, assignee of the instant application. This success has been widely recognized, including by the governments of the United States and Japan, in the form of awards. *See* First Kanno Declaration, pages 3-4.

In view of the foregoing amendments and remarks, the application is respectfully submitted to be in condition for allowance, and prompt, favorable action thereon is earnestly solicited.

If there are any questions regarding this amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and

please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket #056203.50311US).

Respectfully submitted,

August 8, 2005

Song Zhu Reg. No. 44,420

James F. McKeown
Registration No. 25,406
Kening Li
Registration No. 44,872

CROWELL & MORING LLP
Intellectual Property Group
P.O. Box 14300
Washington, DC 20044-4300
Telephone No.: (202) 624-2500
Facsimile No.: (202) 628-8844
KLI (390114)